

## **Radiological Attacks: Risks, Consequences, and Preparedness**

Harvard International Working Group on Radiological Weapons, Dr. Jim Walsh, Chair

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### **INTRODUCTION**

The purpose of this paper is to report on the results and analysis of a year-long study by the Harvard International Working Group on Radiological Weapons (Rad Group) on the topic of radiological weapons and events.

### **DESCRIPTION OF ACTUAL WORK**

The Rad Group consists of approximately thirty individuals from ten countries who met once a week during the 2002-2003 academic year. The group members represent a broad array of disciplines, including physics, nuclear engineering, chemistry, international relations, health physics, anthropology, law, and public policy. The group collected and reviewed the current literature on radiological weapons. Each member then assumed responsibility for researching a particular topic relating to the radiological threat. Group members then presented their findings, received feedback, and wrote short research papers on the topics.

Research topics included: the definition of a radiological attack, terrorist motivations and radiological weapons, the physical characteristics and health consequences of radiological materials likely to be used in a radiological attack, current computer simulations of a radiological attack, the risks and consequences of attacks on nuclear power plants and spent fuel ponds, public perceptions of radioactivity, the psychological consequences of a radiological event, remediation following a radiological attack, control of radiological materials in the US, control of radiological materials in Europe, control of radiological materials in the EU, international efforts to prevent radiological attacks. The study's authors also produced a series of ten mini-case studies of terrorist and non-terrorist events that offer an empirical basis for evaluating different aspects of a radiological event. The case studies include civilian nuclear accidents, nuclear weapons accidents, radiological contamination events, bio-terrorist attacks, and conventional mass casualty terrorist attacks.

The Rad Group study provides an alternative perspective to many, if not most, studies of radiological weapons. This study is empirical and international in approach, and it focuses on areas usually ignored in the literature on radiological attacks. For example, the typical study of radiological weapons begins with the observation that the most important consequences of a rad attack will be social, psychological, and economic, and that the number of casualties caused by exposure to radiological materials will be modest compared with deaths and injuries caused by the conventional explosives used in an attack. In spite of this observation, the typical then concentrates its attention on the health effects of various isotopes or on the mechanisms for improving regulation of the most deadly radiological sources (e.g., DOE's "categorization" initiative). By contrast this study focuses on the social, psychological, and economic consequences of a radiological event and does so through the creative and systematic use of case studies.

### **RESULTS**

The results of the study indicate that the most commonly cited social pathology associated with a radiological attack – panic – is unlikely, but that individual psychological consequences could be severe, particularly for at-risk populations such as children, mothers of young children, people with pre-existing psychological conditions, and responders who travel in or near contaminated areas. The economic consequences for a given locality could be large or small depending on a number of variables, many of which relate to the mobility of residents, businesses, and markets. Local economies dependent on tourism or agriculture, for example, will likely face severe short-term dislocations as out-of-area consumers can easily turn elsewhere for foodstuffs or entertainment. The largest non-local economic impact will likely be felt by the civilian nuclear industry and by sectors that make intensive use of whatever radiological material is used in the attack.

Perhaps the most noteworthy findings of the study related to the current state of preparedness for a radiological event. Here the news is both good and bad. On the one hand, many communities, especially those near civilian or other nuclear facilities, have a radiological emergency response plan. In general, however, Federal, state, and local governments are grossly unprepared for a radiological attack. In particular, little attention has been paid to the

problems of inter- and intra-government agreement on radiation standards, responding to the psychological dimensions of an attack, developing an effective public communications strategy, and economic remediation in urban areas – to name a few. The study goes on to make a series of recommendations that could begin to address these very serious shortcomings.